

PATENT ABSTRACTS OF JAPAN

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(71)Applicant : SONY CORP

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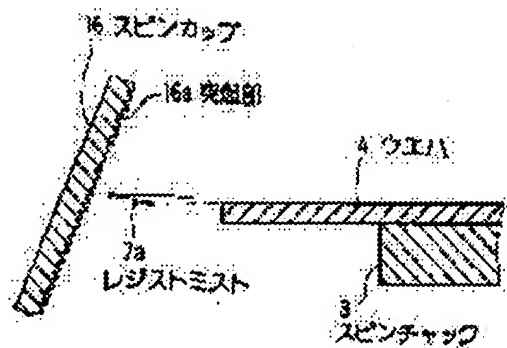
(72)Inventor : NISHIMURA HIDEKUNI

(54) RESIST COATING DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a resist coating device capable of reducing abnormality of a resist pattern caused by restocking of resist mist on a wafer surface.

SOLUTION: Plural projection parts 16a are formed on an inside surface of a spin cup 16 surrounding the circumference of the wafer 4 with a several μm -several tens μm spacing. Thus, since an adhering surface between the resist mist 7a and the inside surface of the spin cup 16 is increased and an adhering force with the resist mist 7a can be enhanced, a rebounding amount of the resist mist 7a decrease. Therefore, resticking of the resist most 7a on the wafer 4 is also suppressed and the abnormality of the resist pattern can be reduced.



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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, although the droplet of the resist which dispersed from the front face of such a wafer 4 has usually adhered to the spin cup 6, it has carried out the reattachment plentifully on the front face of a wafer 4 on the contrary in the spin cup 6 (refer to drawing 5 and drawing 6). Although the droplet of such a resist is called resist Myst, this resist Myst 7a becomes a mask, and there is a problem of causing the abnormalities in a resist pattern at the time of wiring formation of the aluminum-Si film (wiring film) 8.

[0006] That is, although three resist patterns must be perpendicularly formed on the wafer 4 properly speaking as typically shown in drawing 7 , the abnormalities F in a resist pattern occur by the reattachment of resist Myst 7a. In addition, the part without hatching the part of hatching shown with a sign 7 in drawing 7 indicates the front face of the resist film 7 to be with a sign 8 again shall express the front face of the wiring film 8, and the part of hatching further shown with a sign 9 shall express the side attachment wall of the resist film 7.

[0007] In order to prevent the abnormalities in a resist pattern by such resist Myst, in JP,5-66963,U, the resist receptacle section is formed in the periphery section of circular body of revolution which fixes a wafer and rotates, and the rotation coater which accumulated the surplus resist which flows out during resist spreading to a wafer in the resist receptacle section of this body of revolution is proposed. however -- body of revolution -- it is necessary to prepare a member separately and, and the processing is also complicated.

[0008] Moreover, the rotation coater of the structure which arranged the tubed part material which made the tilt angle of a drum section adjustable according to the rotational speed of a wafer between the wafer and the spin cup is proposed by JP,3-128472,U. However, this will also need to prepare a thing called tubed part material separately.

[0009] Furthermore, although the structure which formed the annular shield is proposed by JP,1-120980,U, this will also need to form a so-called shield in it, so that the recoil trajectory of resist Myst of facing to a wafer from a spin cup may be interrupted in the upper part of a spin cup.

[0010] In addition, although the structure of preventing resist Myst adhering to the rear-face, i.e., field held by spin chuck, side of a wafer is proposed by JP,63-188939,U and JP,5-206019,A, for example, the configuration for preventing that resist Myst carries out the reattachment to a wafer front face is not shown.

[0011] This invention is made in view of an above-mentioned problem, the reattachment of resist Myst to a wafer front-face top is stopped, and it aims at offering the resist coater which can decrease the abnormalities in a resist pattern by resist Myst.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the outline partial sectional side elevation of the resist coater by the example of this invention.

[Drawing 2] It is the expanded sectional view of the important section in drawing 1.

[Drawing 3] It is the sectional view showing the modification of the shape of surface type of the height concerning this invention, and A shows a cone configuration and B shows the Nogata configuration.

[Drawing 4] It is the outline perspective view of the resist coater used conventionally.

[Drawing 5] It is an outline partial sectional side elevation explaining an operation of the conventional resist coater.

[Drawing 6] It is the enlarged drawing of the important section in drawing 5.

[Drawing 7] It is the mimetic diagram showing the abnormalities in a resist pattern.

[Description of Notations]

2 [.. A nozzle, 7 / .. A resist, 7a / .. Resist Myst, 16 / .. A spin cup, 16a, 18, 19 / .. Height.] A revolving shaft, 3 .. A spin chuck, 4 .. A wafer, 5

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MEANS

[Means for Solving the Problem] The spin chuck which the above technical problem is prepared in the upper limit of the revolving shaft arranged in the direction of a vertical, and this revolving shaft, and holds a coated object, While equipping the front face of said coated object with the nozzle which carries out the regurgitation of the resist, and the tubed part material surrounding the perimeter of said coated object and carrying out the regurgitation of said resist to the front face of said coated object from said nozzle In the resist coater which is made to rotate said coated object and applied said resist to homogeneity on the front face of said coated object Two or more heights are formed in the inside front face of said tubed part material, and, therefore, the resist coater characterized by making it make the droplet of said excessive resist which disperses from the front face of said coated object adhere to these two or more heights is solved.

[0013] It is made hard to make [make it adhere to two or more heights formed in the inside front face of tubed part material / happening, since this invention is not the configuration in which the recoil of resist Myst has the flat inside front face of the conventional tubed part material, and resist Myst is caught /, the droplet, i.e., resist Myst, of a resist, and] increase the adhesion side to the tubed part material of resist Myst by this and leave.

[0014]

[Embodiment of the Invention] Two or more heights are formed in the inside front face of the tubed part material surrounding the perimeter of a coated object, and it is made to make it adhere, the droplet, i.e., resist Myst, of the resist which disperses from the front face of a coated object here. Since surface area increases by formation of a height and an adhesion side with resist Myst therefore also increases, adhesion force of the inside front face of tubed part material with resist Myst improves. Thereby, the amount of recoil of resist Myst can be stopped and the abnormalities in a pattern by resist Myst can be decreased.

[0015] Since the magnitude of resist Myst is several micrometers - dozens of micrometers, it can increase an adhesion side with resist Myst, and can make resist Myst adhere efficiently by forming the above-mentioned height at this spacing, and making the shape of surface type of a height hemispherical, for example.

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EXAMPLE

[Example] Hereafter, the example of this invention is explained with reference to a drawing.

[0017] Drawing 1 is the partial expansion sectional side elevation showing the resist coater by the example of this invention roughly. In the inside front face of the spin cup as tubed part material concerning this invention arranged so that the perimeter of the wafer 4 by which vacuum adsorption was carried out may be surrounded to a spin chuck 3, or the coater cup 16. As shown in drawing 2, two or more height 16a is formed, and since the magnitude of resist Myst 7a is several micrometers - dozens of micrometers, height 16a is formed at this spacing at this example.

[0018] The shape of surface type of height 16a is hemispherical, and by this example, it is formed so that a wave-like curve may be drawn in the front face, as shown in drawing 2. He is trying to increase the surface area on the front face of the inside of a spin cup 16 by this.

[0019] Next, if this operation is explained, resist Myst 7a which dispersed in the side from the front face of a wafer 4 according to the centrifugal force will adhere to two or more height 16a formed in the inside front face of a spin cup 16 during resist spreading to a wafer 4. Since the surface area on the front face of the inside of a spin cup 16 increases by existence of height 16a of these plurality at this time, the adhesion area of the inside front face of this spin cup 16 and resist Myst 7a increases, and it is hard coming to separate resist Myst 7a.

[0020] That is, height 16a makes resist Myst 7a hooked here, serves to stop the recoil of resist Myst 7a, and is raising the adhesion force between resist Myst 7a and the inside front face of a spin cup 16.

[0021] The recoil of resist Myst 7a can be stopped as mentioned above, therefore the abnormalities in a pattern by the reattachment to the wafer 4 top of resist Myst 7a can decrease, and the yield of a product can be raised.

[0022] As mentioned above, of course based on the technical thought of this invention, various deformation is possible for this invention, although the example of this invention was explained, without being limited to this.

[0023] For example, although the shape of surface type of two or more height 16a formed in the inside front face of a spin cup 16 was made hemispherical in the above example, it is good not only for this but drawing 3 A and drawing 3 B also as a configuration shown with a sectional view. Although drawing 3 A shows the height 18 of a cone configuration and drawing 3 B shows the height 19 of the Nogata configuration, it is the configuration in which all extend an adhesion side with resist Myst. If these heights 18 and 19 are formed at intervals of several micrometers - dozens of micrometers also in this case, the same effectiveness as an above-mentioned example will be acquired.

[0024] Moreover, it is good also as a tubed configuration of the shape of a cylindrical shape which made the configuration of the spin cup 16 surrounding the perimeter of a wafer 4 incline in a wafer 4 side in the above example and which replaced with this and made the inside front face the direction of a path and perpendicular of a wafer 4 although considered as the semicircle drill configuration so to speak, and other cross-section configurations.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the resist coater which is made to rotate a coated object and applies a resist to homogeneity according to a centrifugal force in a coated body surface.

[0002]

[Description of the Prior Art] The resist coater roughly shown in drawing 4 from before is used for the photoresist process at the time of production of a large-scale integrated circuit (LSI) etc. irrespective of a bipolar transistor and an MOS transistor.

[0003] This resist coater is shown by 1 as a whole, the spin chuck 3 which holds the semi-conductor wafer (a wafer is only called hereafter.) 4 as a coated object is formed in the upper limit section of the revolving shaft 2 arranged in the direction of a vertical, and he is trying for this to hold a wafer 4 for example, by vacuum adsorption. The spin cup or the coater cup 6 is arranged as tubed part material so that the nozzle 5 which carries out the regurgitation of the resist may be arranged by the method of right above of a wafer 4 and the perimeter of a wafer 4 may be surrounded.

[0004] And after breathing out a resist 7 on the front face of a wafer 4 from a nozzle 5 during a halt of a wafer 4 or rotation, he is trying to apply a resist 7 to homogeneity on the whole front face of a wafer 4 according to a centrifugal force by carrying out high-speed rotation of the wafer 4. Although the excessive resist 7 disperses from the front face of a wafer 4, he is trying to make this adhere to the inside front face of a spin cup 6 during rotation of a wafer 4.

[0005]

[Problem(s) to be Solved by the Invention] However, although the droplet of the resist which dispersed from the front face of such a wafer 4 has usually adhered to the spin cup 6, it has carried out the reattachment plentifully on the front face of a wafer 4 on the contrary in the spin cup 6 (refer to drawing 5 and drawing 6). Although the droplet of such a resist is called resist Myst, this resist Myst 7a becomes a mask, and there is a problem of causing the abnormalities in a resist pattern at the time of wiring formation of the aluminum-Si film (wiring film) 8.

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[0025]

[Effect of the Invention] According to the resist coater of this invention, as stated above, by raising the adhesion force of resist Myst and a tubed part material inside front face, the recoil of resist Myst can be stopped, therefore, the abnormalities in a resist pattern by the reattachment of resist Myst to a wafer front-face top can decrease, and the yield of a product can be raised.

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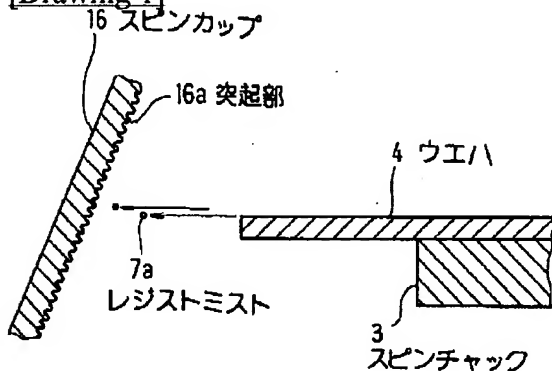
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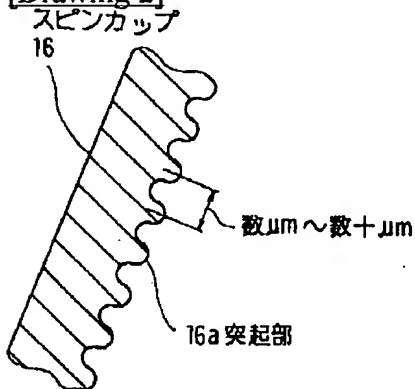
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DRAWINGS

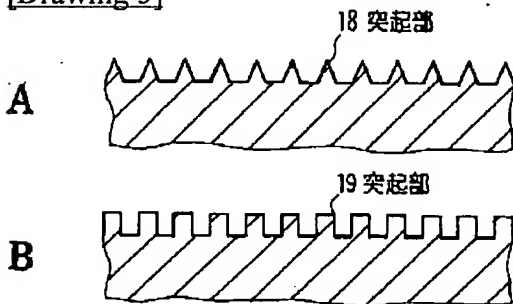
[Drawing 1]



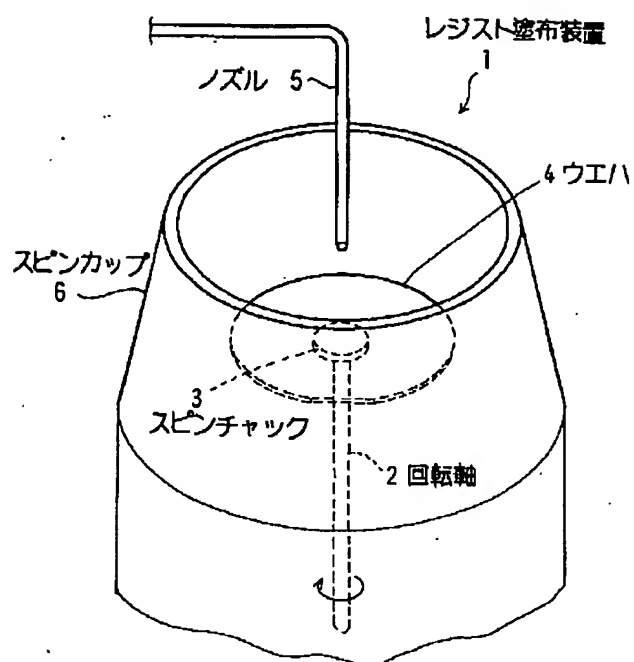
[Drawing 2]



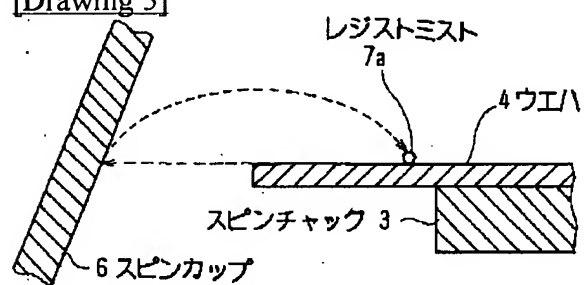
[Drawing 3]



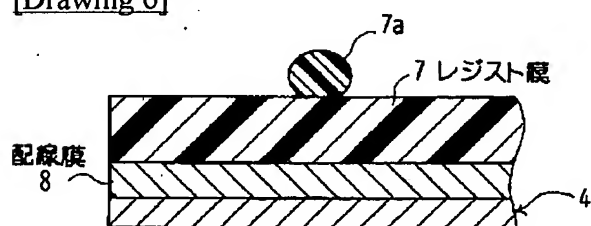
[Drawing 4]



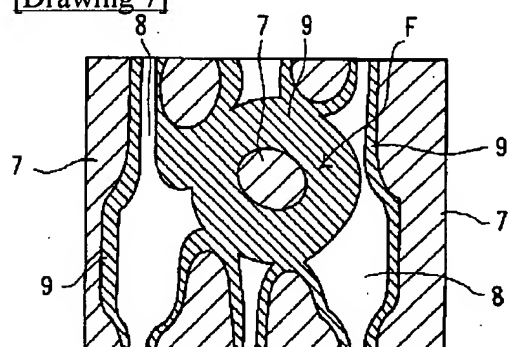
[Drawing 5]



[Drawing 6]



[Drawing 7]



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(71)出願人 000002185

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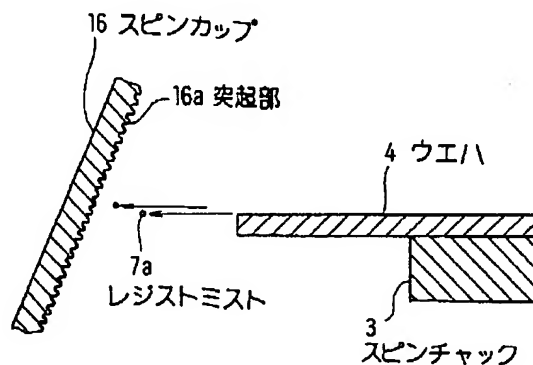
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(54)【発明の名称】 レジスト塗布装置

(57)【要約】

【課題】 ウエハ表面上へのレジストミストの再付着によるレジストパターン異常を減少させることができるレジスト塗布装置を提供すること。

【解決手段】 ウエハ4の周囲を囲むスピнкаップ16の内側表面に、数 μ m〜数十 μ m間隔に複数の突起部16aを形成する。これによりレジストミスト7aとスピнкаップ16の内側表面との接着面を増大させ、レジストミスト7aとの付着力を向上させることができ、よって、レジストミスト7aのはね返り量が減少する。したがって、ウエハ4上へのレジストミスト7aの再付着も抑えられ、これによるレジストパターン異常を減少させることができる。



【特許請求の範囲】

【請求項1】 鉛直方向に配設される回転軸と、該回転軸の上端に設けられ被塗布体を保持するスピチャックと、前記被塗布体の表面にレジストを吐出するノズルと、前記被塗布体の周囲を囲む筒状部材とを備え、前記被塗布体の表面に前記ノズルから前記レジストを吐出すると共に、前記被塗布体を回転させて前記被塗布体の表面に前記レジストを均一に塗布するようにしたレジスト塗布装置において、
前記筒状部材の内側表面に複数の突起部を形成し、
該複数の突起部に、前記被塗布体の表面から飛散する余分な前記レジストの飛沫を付着させるようにしたことを特徴とするレジスト塗布装置。

【請求項2】 前記突起部は、数 μm 乃至数十 μm の間隔で形成されることを特徴とする請求項1に記載のレジスト塗布装置。

【請求項3】 前記突起部の表面形状は、半球状であることを特徴とする請求項1又は請求項2に記載のレジスト塗布装置。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、被塗布体を回転させてレジストを遠心力によって被塗布体表面に均一に塗布するレジスト塗布装置に関する。

【0002】

【従来の技術】バイポーラトランジスタ、MOSTランジスタにかかわらず、大規模集積回路（LSI）等の作製時におけるフォトリソ工程には、従来より図4に概略的に示すレジスト塗布装置が用いられる。

【0003】このレジスト塗布装置は全体として1で示され、鉛直方向に配設された回転軸2の上端部には被塗布体として半導体ウェハ（以下、単にウェハと称する。）4を保持するスピチャック3が設けられ、これは例えば真空吸着にてウェハ4を保持するようにしている。ウェハ4の直上方にはレジストを吐出するノズル5が配設されており、また、ウェハ4の周囲を囲むように筒状部材としてスピカップもしくはコートカップ6が配設されている。

【0004】そして、ウェハ4の停止または回転中にノズル5からレジスト7をウェハ4の表面上に吐出した後、ウェハ4を高速回転させることにより、遠心力によりレジスト7をウェハ4の表面全体に均一に塗布するようにしている。ウェハ4の回転中、ウェハ4の表面から余分なレジスト7が飛散するが、これをスピカップ6の内側表面に付着させるようにしている。

【0005】

【発明が解決しようとする課題】しかしながら、このようなウェハ4の表面から飛散したレジストの飛沫は、通常はスピカップ6に付着したままであるが、スピカップ6ではね返ってウェハ4の表面上に再付着してしま

うことが多々ある（図5、図6参照）。このようなレジストの飛沫はレジストミストと呼ばれているが、このレジストミスト7aがマスクとなり、A1-Si膜（配線膜）8の配線形成時のレジストパターン異常を引き起こしてしまうという問題がある。

【0006】すなわち、図7に模式的に示すように、本来ならばウェハ4上に縦に3本のレジストパターンが形成されなければならないのであるが、レジストミスト7aの再付着によりレジストパターン異常Fが発生する。

なお、図7において符号7で示すハッチングの部分はレジスト膜7の表面を、また符号8で示すハッチングなしの部分は配線膜8の表面を表し、さらに符号9で示すハッチングの部分はレジスト膜7の側壁を表すものとす

る。
【0007】このようなレジストミストによるレジストパターン異常を防止するために、実開平5-66963号公報においては、ウェハを固定して回転する円形の回転体の外周部にレジスト受け部を形成し、ウェハへのレジスト塗布中に流れ出る余剰レジストをこの回転体のレジスト受け部にて溜めるようにした回転塗布装置が提案されている。しかしながら、回転体なる部材を別途設ける必要があり、またその加工も複雑である。

【0008】また、実開平3-128472号公報にはウェハとスピカップとの間に、ウェハの回転速度に応じて胴部の傾斜角を可変とした筒状部材を配設した構造の回転塗布装置が提案されている。しかしながら、これもまた筒状部材というものを別途設ける必要が生じる。

【0009】さらに、実開平1-120980号公報にはスピカップの上部に、スピカップからウェハに向かうレジストミストのはね返り径路を遮るように、環状の遮蔽板を設けた構造が提案されているが、これもまた遮蔽板なるものを形成する必要が生じる。

【0010】なお、例えば実開昭63-188939号公報、特開平5-206019号公報には、ウェハの裏面側、すなわちスピチャックにより保持される面側にレジストミストが付着するのを防止する構造が提案されているが、ウェハ表面にレジストミストが再付着するのを防止するための構成は、示されていない。

【0011】本発明は上述の問題に鑑みてなされ、ウェハ表面上へのレジストミストの再付着を抑え、レジストミストによるレジストパターン異常を減少させることができるレジスト塗布装置を提供することを目的とする。

【0012】

【課題を解決するための手段】以上の課題は、鉛直方向に配設される回転軸と、該回転軸の上端に設けられ被塗布体を保持するスピチャックと、前記被塗布体の表面にレジストを吐出するノズルと、前記被塗布体の周囲を囲む筒状部材とを備え、前記被塗布体の表面に前記ノズルから前記レジストを吐出すると共に、前記被塗布体を回転させて前記被塗布体の表面に前記レジストを均一に

塗布するようにしたレジスト塗布装置において、前記筒状部材の内側表面に複数の突起部を形成し、該複数の突起部に、前記被塗布体の表面から飛散する余分な前記レジストの飛沫を付着させるようにしたことを特徴とするレジスト塗布装置、によって解決される。

【0013】本発明は、レジストミストのはね返りは、従来の筒状部材の内側表面が平坦であってレジストミストが引っ掛かる形状になっていないために起こるということに着目し、筒状部材の内側表面に形成した複数の突起部にレジストの飛沫、すなわちレジストミストを付着させ、これによりレジストミストの筒状部材への接着面を増加させ、離れにくくする。

【0014】

【発明の実施の形態】被塗布体の周囲を囲む筒状部材の内側表面に複数の突起部を形成し、ここに被塗布体の表面から飛散するレジストの飛沫、すなわちレジストミストを付着させるようにする。筒状部材の内側表面は突起部の形成により表面積が増大し、よってレジストミストとの接着面も増加するので、レジストミストとの付着力が向上する。これにより、レジストミストのはね返り量を抑えることができ、レジストミストによるパターン異常を減少させることができる。

【0015】レジストミストの大きさは、数 μm ～数十 μm であるので、この間隔で上記突起部を形成し、また突起部の表面形状を例えば半球状とすることにより、レジストミストとの接着面を増大させ、効率よくレジストミストを付着させることができる。

【0016】

【実施例】以下、本発明の実施例について図面を参照して説明する。

【0017】図1は本発明の実施例によるレジスト塗布装置を概略的に示す部分拡大側断面図であり、スピッチャック3に真空吸着されたウエハ4の周囲を囲むように配設される本発明に係る筒状部材としてのスピンカップもしくはコートカップ16の内側表面には、図2に示すように複数の突起部16aが形成されており、本実施例ではレジストミスト7aの大きさが数 μm ～数十 μm であるため、この間隔で突起部16aを形成している。

【0018】突起部16aの表面形状は半球状であり、本実施例ではその表面を図2に示すように波形のカーブが描かれるように形成されている。これによりスピンカップ16の内側表面の表面積を増大させるようにしている。

【0019】次にこの作用について説明すると、ウエハ4へのレジスト塗布中、遠心力によりウエハ4の表面より側方に飛散したレジストミスト7aは、スピンカップ16の内側表面に形成された複数の突起部16aに付着する。このとき、これら複数の突起部16aの存在によりスピンカップ16の内側表面の表面積が増大するので、このスピンカップ16の内側表面とレジストミスト

7aとの接着面積が増大し、レジストミスト7aは離れにくくなる。

【0020】すなわち、突起部16aはここにレジストミスト7aを引っ掛けさせ、レジストミスト7aのはね返りを抑える働きをし、レジストミスト7aとスピンカップ16の内側表面との間の付着力を向上させている。

【0021】以上のようにして、レジストミスト7aのはね返りを抑えることができ、よってレジストミスト7aのウエハ4上への再付着によるパターン異常が減少し、製品の歩留まりを向上させることができる。

【0022】以上、本発明の実施例について説明したが、勿論、本発明はこれに限定されることなく、本発明の技術的思想に基づいて種々の変形が可能である。

【0023】例えば以上の実施例では、スピンカップ16の内側表面に形成した複数の突起部16aの表面形状を半球状としたが、これに限らず、図3Aおよび図3Bに断面図で示す形状としてもよい。図3Aは円錐形状の突起部18を示し、図3Bは直方形状の突起部19を示しているが、いずれもレジストミストとの接着面を拡げる形状となっている。この場合もまた、これら突起部18、19を数 μm ～数十 μm の間隔で形成すれば、上述の実施例と同様な効果が得られる。

【0024】また以上の実施例では、ウエハ4の周囲を囲むスピンカップ16の形状をウエハ4側に傾斜させた、いわば半円錐形状としたが、これに代えて、その内側表面をウエハ4の径方向と垂直にした円筒形状、またはその他の断面形状の筒状形状としてもよい。

【0025】

【発明の効果】以上述べたように、本発明のレジスト塗布装置によれば、レジストミストと筒状部材内側表面との付着力を上げることによりレジストミストのはね返りを抑えることができ、よって、ウエハ表面上へのレジストミストの再付着によるレジストパターン異常が減少し、製品の歩留まりを向上させることができる。

【図面の簡単な説明】

【図1】本発明の実施例によるレジスト塗布装置の概略部分側断面図である。

【図2】図1における要部の拡大断面図である。

【図3】本発明に係る突起部の表面形状の変形例を示す断面図であり、Aは円錐形状、Bは直方形状を示す。

【図4】従来より用いられるレジスト塗布装置の概略斜視図である。

【図5】従来のレジスト塗布装置の作用を説明する概略部分側断面図である。

【図6】図5における要部の拡大図である。

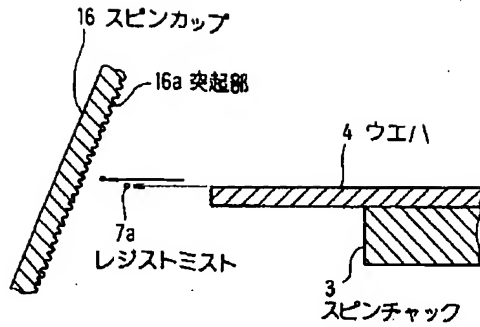
【図7】レジストパターン異常を示す模式図である。

【符号の説明】

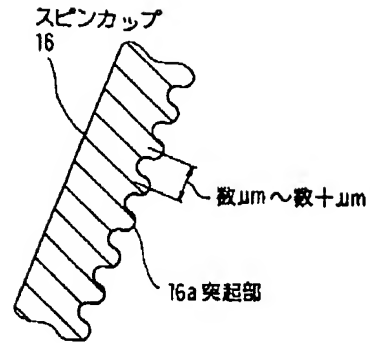
2……回転軸、3……スピッチャック、4……ウエハ、5……ノズル、7……レジスト、7a……レジストミスト、16……スピンカップ、16a、18、19……突

起部。

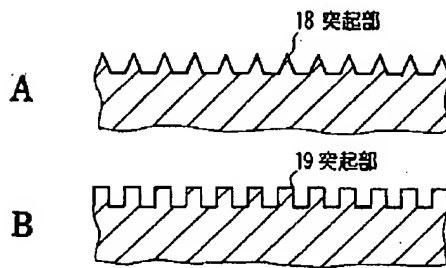
【図1】



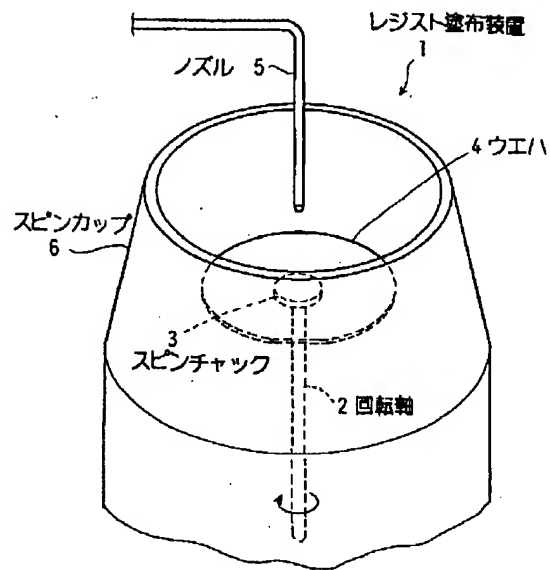
【図2】



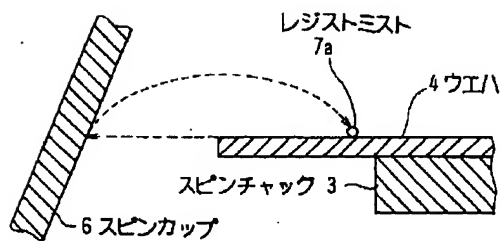
【図3】



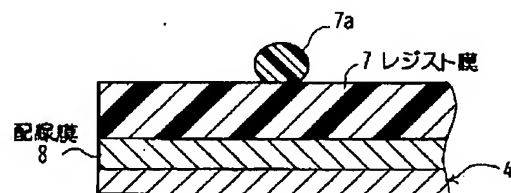
【図4】



【図5】



【図6】



(5)

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【図7】

